...information for the Defense modeling and simulation community...

DMSO NEWS

Volume 3 Number 4 Winter 1998

INSIDE ...

1st acceptance as int'l standard

OMG adopts HLA Specification v1.3

By Dr. Judith Dahmann
DMSO Chief Scientist

On November 11, the Board of Directors of the Object Management Group (OMG) formally adopted the DoD's High Level Architecture (HLA) Interface Specification v1.3 as the facility for Distributed Simulation Systems. The HLA Interface Specification defines the interface between the interoperation facility, or Runtime Infrastructure (RTI), and the federates in an HLA federation.

The OMG's action, which marks the first adoption of the HLA as a formal industry standard, is a major milestone in the DoD's ongoing process to transition the HLA to broad use in the DoD and industry in the U.S. and internationally

The Defense Modeling and Simulation Office (DMSO) submitted the HLA Interface Specification for OMG consideration in February. This followed a year of participation in OMG meetings and activity in the OMG Special Interest Group for Distributed Simulation, which is cochaired by representatives from industry and the DMSO. The OMG standardization review process includes a series of reviews by the OMG architecture board, open comment by industry, endorsement by OMG domain body, vote by OMG members and, finally, adoption by the OMG Board of Directors.

The OMG is a non-profit industry consortium with over 800 members. "(It) was formed (in 1989) to create a component-based software marketplace by hastening the introduction of standardized object software. The organization's charter includes the establishment of industry guidelines and detailed object management specifications to provide a common framework for application development."

The OMG is perhaps best known for its development of the Common Object Request Broker Architecture (CORBA) standards. More information about the Object Management Group is available at the organization's web site at *http://www.omg.org/*.

DMSO to report Y2K compliance status of DoD models, simulations

By Terry Hines
DMSO Staff

The Defense Modeling and Simulation Office (DMSO) will soon be reporting the Year 2000 (Y2K) compliance status of over 990 Department of Defense (DoD) models and simulations, according to Gary Yerace, DMSO Chief of Staff and lead for the DoD Y2K modeling and simulation (M&S) compliance program.

Each of the Military Services, the Joint Staff and many of the DoD agencies, including the Defense Information Systems Agency (DISA), the Defense Threat Reduction Agency (DTRA), the National Imagery and Mapping Agency (NIMA), the National Security Agency (NSA), the Defense Intelligence Agency (DIA) and the Ballistic Missile Defense Organization (BMDO), have been tasked to categorize each of their respective models and simulations in one of five phases of compliance — *Awareness, Assessment, Renovation, Validation, and Implementation* — and report the level of compliance of each in accordance with the DoD Year 2000 Master Plan.

Complicating the process is the requirement for owners of models or simulations that ex-

See Y2K M&S Compliance, p. 16

Photo by Steve Wilson

Director's Corner

Col Crash Konwin, USAF

"Partnership – the second of the three important elements of success"

As the requirements grow and resources shrink for the military in general and the modeling and simulation (M&S) community in particular, individuals and organizations are becoming even more resourceful in their thinking and actions. While teamwork has always been a valued attribute of military organizations, there is a growing appreciation that teamwork alone will not suffice. In today's challenging environment, partnerships are vital for success in many key modeling and simulation areas.

What's the difference between teamwork and partnership? In my view, a partnership is a mutually interdependent agreement in which each of the partners has an equity stake in the success of the venture. It does not mean that all the partners have identical objectives, but rather they have sufficiently complementary objectives that can result in mutual success or a win-win situation if the venture is successfully executed. Partnerships in business are formed when there are compelling reasons for two or more members or organizations to collaborate – risk sharing when projects require innovative, but unproven, technologies or require large resources beyond the comfort level of any one person/organization to independently fund; formation of a critical mass of key personnel with complementary, yet scarce, technical skills necessary to execute a complex mission or project; creation of unions whose primary purpose is to foster closer organizational relationships between strategic allies.

"...a partnership is a mutually interdependent agreement in which each of the partners has an equity stake in the success of the venture."

In the modeling and simulation arena, more and more partnerships are being formed for reasons like the above. As all of our resources get tighter and tighter, we collectively are seeking out partnerships that can result in a win-win result and accomplishment of our collective missions. The DMSO is no stranger to partnerships, but our more recent experience has shown more and more emphasis on these types of arrangements.

Any listing of DMSO partnerships runs the risk of being incomplete so I will only highlight a few to show how we are using partnerships of many types to foster furthering of the DoD Modeling and Simulation Master Plan objectives.

In the area of the Common Technical Framework, the implementation of the High Level Architecture has just begun in earnest. Each of the Services and Agencies has begun the review of key simulations and begun the process of

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DMSO NEWS

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Chief, Financial Operations
Mr. Waverly Debraux

Editor
Mr. Sherrel W. Mock

Photographer
Mr. Steve W. Wilson

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ITEC Asia '98 in Singapore

Asia-Pacific gets up-close look at DoD CTF

By William J. Wallace
DMSO HLA Staff

The Defense Modeling and Simulation Office (DMSO) was a primary contributor in developing the program for the Fourth Annual "International Training and Education Conference" (ITEC) in Singapore, Oct. 21-22.

ITEC Asia '98 was the first conference in the Asia-Pacific region that has featured such an extensive look — tutorials, two international panels, exhibits and other presentations – at the U.S. Department of Defense (DoD) High Level Architecture (HLA), the cornerstone of the DoD's Common Technical Framework for modeling and simulation (M&S). Over 100 technical leaders from the Ministries of Defense, Industry and Academia of countries from four continents gathered to discuss the future of distributed simulation across a broad spectrum of uses, including acquisition, analysis and training.

Air Force **Col "Crash" Konwin**, DMSO Director, provided the keynote address, "Why Simulation and Why Distributed Simulation?" Col Konwin cited calls from senior U.S. DoD leadership for increased use of simulation, and in particular distributed simulation, to address problems of increasing complexity facing the U.S. Defense community. He concluded by emphasizing the importance of "*people*, *partnerships*, and *pragmatism*" in discovering the "affordable way ahead" though these challenging times.

International panel members from Australia, France, Russia, Singapore, Sweden and the United Kingdom discussed how their countries are implementing the HLA in their own M&S programs.

The panel, moderated by **Mr. Mick Ryan**, United Kingdom, included **Dr. Peter Clark**, Senior Research Scientist for Simulation with the Defence Science and Technology Organisation, Department of Defence, Australia; **Dr. Jean-Louis Igarza**, Chef du Department, Center d'Analyse de Defense, Ministry of Defense, France; **Col. Alexander Vankov**, Leading Scientist, Gagarin Cosmonaut Training Centre, Moscow, Russia; **Mr. Staffan Lof**, consultant to the Defense Materiel Administration, and President and CEO, Pitch AB, Sweden; and **Mr. Ong Seow Meng**, Head of Simulation Systems, Ministry of Defence, Singapore.

A second panel, moderated by **Dr. Judith Dahmann**, DMSO Chief Scientist, focused on international HLA Tool development. The panel included **Ms. Deborah Fullford**, MaK Technologies, USA; **Mr. Staffan Lof**, PITCH AB, Sweden, and **Mr. Nick Rule**, Logica, United Kingdom.

Dr. Dahmann and **Mr. Robert Lutz** offered tutorial sessions on "Introduction to HLA" and "HLA Object Model Development Process and Supporting Tools," respectively.

Copies of the presentations are available for download at the DMSO web site at *http://www.dmso.mil/dmso/docslib/briefs/ITEC/ASIA98/*.

The DMSO also presented an exhibit during the conference that offered attendees the opportunity to see DoD-provided M&S resources and services and talk to the subject matter experts responsible for their development.

Director's Corner

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update or conversion to become HLA. More and more HLA Federations are being formed and implementations conducted in support of multiple application areas. The DMSO-sponsored HLA Cadre is a technical support team that is assisting key programs within the Department. By blending an HLA veteran's experience with a project's technical workforce that has undergone HLA training, but is just beginning implementation in key areas of technical risk, the DMSO gains significant, firsthand insight into challenging user requirements, while the project benefits from a steeper learning curve.

In the area of Common Services, the DMSO Modeling and Simulation Resource Repository (MSRR) project is guided by a multi-organizational Board of Directors that works collaboratively on complementary technical approaches and solutions while establishing overall functional requirements that are consistent across a heterogeneous implementation across the Services and Agencies. Challenges still remain, but the collective efforts of all stakeholders will clearly better serve the DoD customers looking for information.

In the area of Outreach and Education, the United States recently finished collaboration within the NATO Steering Group on Simulation Policy and Applications. This has resulted in the publication of the first NATO M&S Master Plan that the Council of National Armaments Directors (CNAD) and Military Committee (MC) have forwarded to the North Atlantic Council (NAC) for approval. In order to facilitate early and rapid implementation of more significant use of M&S within NATO, several nations have offered National Voluntary Contributions. The voluntarily nominated people will allow the early staffing of the Simulation Coordination Office (SCO) in the Brussels element of the Research and Technology Agency (RTA) and the NATO Simulation Policy Group (NSPG) within the Research and Technology Board. Access to national M&S services like the MSOSA HLA compliance testing and help desk are other examples of interim services provided by the United States in this international partnership through NATO.

The bottom line — in order to be effective in this ever increasingly interdependent world, active participation in key partnerships will be vital. As in every relationship, every day or challenge will not be easy. The benefits of productive partnerships will be enhanced through professional commitment, personal energy, and organizational reliability — make partnerships your organizational force multiplier!

Cheers,
Crash

MS 101 to debut at I/ITSEC

MSSOC completes first academic year

By Tom Stanford
MSSOC Project Director

The DoD Modeling and Simulation (M&S) Staff Officer (MSSOC) will complete its first academic year in December. The five-day course, will be conducted Dec. 7-11 at the Joint Training, Analysis and Simulation Center (JTASC) in Suffolk, VA.

The MSSOC has educated almost 400 students this year in the basics of DoD M&S. An entry-level course on M&S for new staff officers, allies, and DoD contractors, the MSSOC was conducted eleven times this year in Albuquerque, NM; Alexandria, VA; Orlando, FL; and the Warrior Preparation Center in Einsiedlerhof, Germany. The 1999 schedule (see box on p. 5) promises to be even busier with regional offerings in the Southeast, Midwest, West Coast, Europe, Pacific, as well as in Washington, DC. Prospective students should apply online at the MSSOC web site at *http://www.dmso.mil/SOC/*.

Forty-nine U.S. and international students graduated from MSSOC 98-10, conducted Oct. 26-30, in Alexandria, VA. Students came from a wide variety of DoD M&S activities, the Canadian Air Staff, and included an Australian officer assigned to National Imagery and Mapping Agency (NIMA). The Canadian and Australian graduates were the first MSSOC graduates from their respective countries. (Previous allied graduates have come from the United Kingdom and Germany.)

The Defense Modeling and Simulation Office (DMSO) M&S Education Team is working on a variety of other offerings, each designed for a different M&S audience. These include:

• The *Executive Level Orientation (ELO)*, available now, is designed to provide senior DoD executives with a broad overview of current DoD M&S policies, organizations and issues. The *ELO* enhances the senior executive's ability to make decisions involving the use of M&S. Orientations are tailored to the recipient to better ensure that the provided information is appropriate for his/her area of responsibility.

• The *M&S Survival Course for Program Management Staffs* will assist the acquisition Program Manager (PM) and his/her staff in the use of M&S in the acquisition cycle. Designed to be taught on location and targeted specifically toward the PM's staff, this course will present DoD M&S information, tools for use by the PM staff and sources of M&S information. It will include examples of M&S support to current acquisition projects and a case study. This course is scheduled for testing in January.

• *MS 101* will be a tutorial for presentation to large audiences, ideally at conferences, seminars and symposiums. Presenting basic DoD M&S information in a highly visual manner, it will rely heavily on multi-media and enhanced graphics to present the course information. The target audience is newcomers to M&S. This course will debut in a tutorial session at Interservice and Industry Training, Education and Simulation Conference (I/ITSEC) on Nov. 30.

• The *NATO M&S Staff Officer Course* is the newest endeavor. The NATO Modeling and Simulation Master Plan (NATO MSMP) identifies the need for M&S education in NATO. The U.S. has agreed to develop this course as part of its national voluntary contribution. The NATO course will use the U.S. DoD MSSOC as a baseline and the NATO MSMP as a guide. MSSOC course materials will be modified, as appropriate, and new lessons developed, as needed. The NATO course is scheduled for delivery at the NATO School in Oberammergau, Germany in July 99.

Organizations and activities interested in any of these M&S education opportunities should direct inquiries to Army LTC Harry Thompson, DMSO Chief of Operations and MSSOC Program Manager, *thompson@msis.dmso.mil*, or to the Project Director, Mr. Tom Stanford, *tstanfor@msosa.dmso.mil*.

MSOSA adds SBA special interest area

By Marc Erlandson
MSOSA Director of Operations

The Modeling and Simulation Operational Support Activity's (MSOSA) web site is hosting the Defense Department's draft "Road Map" for the implementation of Simulation Based Acquisition (SBA).

This forward-looking concept calls for revolutionizing the military acquisition process by integrating the use of modeling and simulation (M&S) both within and among acquisition programs. The key document describing the SBA concept is the Road Map. The Department of the Defense (DoD) would like to get as much input as possible from both industry and government acquisition professionals in developing this concept. The MSOSA's Special Interest Area (SIA) web site devoted to SBA provides a readily accessible source for the latest version the draft Road Map, as well as all of the most pertinent documentation associated with the topic. The SBA SIA also features an interactive "threaded discussion area" where visitors to the web site can comment and enter into a dialog on the Road Map.

The MSOSA's SIAs provide a means for the M&S community to find and exchange information on key topics. In addition to the SBA site, MSOSA has been running SIA's for *Operations Other than War (OOTW)* and *Human and Organizational Behavior Modeling (HOBM)*. The MSOSA recently introduced two new sites for *the Modeling and Simulation Resource Repository (MSRR) Users Group* and the *DoD Modeling and Simulation Master Plan*. The latter site was introduced as a forum for publishing drafts and soliciting comments on the Master Plan, which is currently under revision. Check the MSOSA web site often for these and other new SIAs at *http://www.msosa.dmso.mil.* Also visit the MSOSA web site for the online interactive *M&S Calendar*, the definitive source of information on M&S events.

Visit the new
"M&S Calendar"
at
http://www.msosa.dmso.mil/mscalendar/

The MSOSA continues to serve as the central M&S help desk. It is the first place to look for M&S advice, information, and answers to specific questions. In addition to general M&S questions, the MSOSA Help Desk also serves as the help desk for High Level Architecture (HLA), the MSRR, and the Master Environmental Library (MEL).

Call the MSOSA Help Desk at (703) 998-1623, or toll free in the Continental U.S. at (888) 56 MSOSA (or 888-566-7672). International toll free numbers for several foreign countries are listed on the MSOSA web site. Send e-mail requests for assistance to *msosahelps@msosa.dmso.mil*.

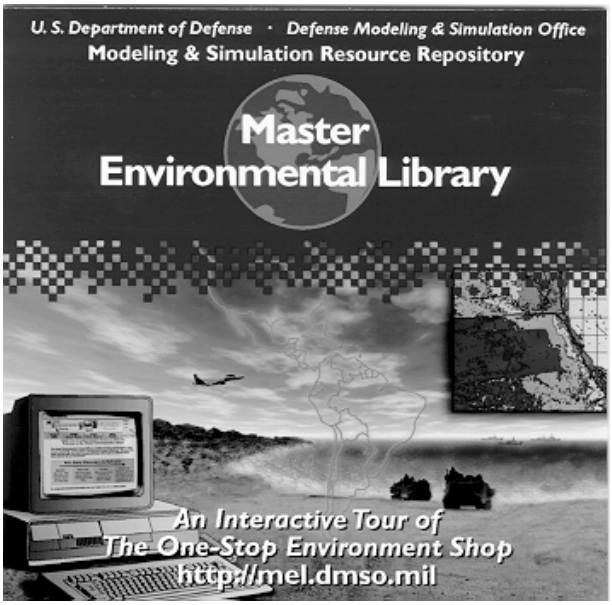
MEL CD, software to debut in Dec., Jan.

By Bruce Donaldson
Ocean Executive Agent Liaison to DMSO

Look for a new CD-ROM and software from the Master Environmental Library (MEL) project in December and January respectively.

CD-ROM Release

The MEL CD-ROM will be released at the Interservice and Industry Training, Simulation and Education Conference (I/ITSEC), which runs Nov. 29 through Dec. 3, in Orlando. The CD will present a self-guided interactive tour of the MEL – how the MEL works, its goals and benefits, and how it can be used for modeling and simulation (M&S), research and analysis, and mission planning and rehearsal. The CD does not contain all the environmental data found in the MEL, but does contain samples for display as part of an eight-minute demonstration.



MEL CD-ROM

The CD also outlines the process for adding resources and Resource Sites to the MEL System. The MSEAs welcome applicants that desire to have their resources discoverable through the MEL or join the MEL System as partner Resource Sites and improve support to the Department of Defense (DoD) M&S community. Use the online MEL at *http://mel.dmso.mil* to gain access to the real environmental data.

Software Release

The DMSO will be upgrading the MEL to Version 2.0 and releasing the new Resource Site software in early January 1999. This upgrade will provide several enhancements and new capabilities. Enhancements include a new, more intuitive interface, better keyword search, and better tools for metadata creation. A major new capability is the addition of an Application Programmer Interface (API) which will allow developers to interface their programs directly to the MEL query, search, and retrieval routines without having to go through the MEL graphical user interface. Systems such as the Weather Scenario Generator, another DMSO project, will be able to directly interface with the MEL to pull out environmental data to create weather scenarios for runtime simulations.

Partnerships

The MEL is a DMSO-sponsored project managed by the DoD Modeling and Simulation Executive Agents (MSEAs), who are responsible for the authoritative representation of the Natural Environment. It is an online web-based service that brings environmental data discovery and ordering capability to the desktop. The MEL serves as a one-stop shop that enables direct and timely access to models, algorithms, data and products for all the environmental domain areas: ocean, terrain, air and space. MEL System capabilities are based on partnerships with various resource providers who develop the card catalog (metadata) descriptions and control the delivery process. These partnerships extend beyond the DoD to include other Federal Agencies that are part of the National Spatial Data Infrastructure.

Pick up a copy of the MEL CD-ROM and other information at the DMSO exhibit, booth #819, at the I/ITSEC in Orlando, Nov. 29 through Dec. 3; or visit the MEL online at *http://mel.dmso.mil*.

For more information contact the MEL Help Desk at 1-888-566-7672, or online at *mel_helps@msosa.dmso.mil*.

1999 M&S Staff Officer Course courses, dates and locations

Dates	Locations	Course Numbers
11-15 Jan	Alexandria, VA	99-1
22-26 Feb	Orlando, FL	99-2
3-7 May	Alexandria, VA	99-3
7-11 Jun	San Diego, CA	99-4
14-18 Jun	Hawaii	99-5
19-23 Jul	Germany (WPC)	99-6
26-30 Jul	NATO School	99-7
20-24 Sep	Alexandria, VA	99-8
(TBD) Oct	Detroit, MI	99-9
15-19 Nov	Alexandria, VA	99-10
13-17 Dec	Orlando, FL	99-11

For additional information, or to apply online visit the MSSOC web page at *http://msis.dmso.mil/SOC/*.

HLA Tools Suite

Continued from p. 7

HLA Tools and Services Bulletin Board

In conjunction with the continuing effort to support HLA implementations the DMSO is also sponsoring the *HLA Tools and Services Bulletin Board*. This feature, available through the HLA web site at *http://hla.dmso.mil*, is provided as a service to the M&S community as a means of enhancing community awareness of the tools and services available to assist in the implementation of the HLA. All tool developers, whether government, commercial or academic, are encouraged to submit their products for posting. Visit the bulletin board for a detailed look at the government and commercial tools now available, or stop by the DMSO exhibit at the I/ITSEC for further details.

Come Test Drive the HLA!

See all of these features in use in conjunction with an actual federation execution at the DMSO exhibit, booth #819, at the I/ITSEC in Orlando, Nov. 30-Dec 3. *Come test drive the HLA!*

For more information contact Chris Turrell at (703) 824-3457 or *cturrell@msis.dmso.mil*.

HLA

JWP 'Trailblazer' demonstrates success in military experimentation

By Anita Zabek
JWP Trailblazer Field Lead

The Joint Warfighting Program (JWP) *Trailblazer* successfully completed its first phase during the week of October 26-30, providing valuable lessons learned and demonstrating the system to the joint experimentation community.

Trailblazer demonstrated the feasibility and effectiveness of using a Department of Defense (DoD) High Level Architecture (HLA) federation to conduct experimentation. The program adopted Information Superiority Experiment (ISX) 1.1, a high-priority Joint Staff J-6 experiment in the Joint Suppression of Enemy Air Defense (JSEAD) domain, as the example experiment.

The *Trailblazer* team followed the HLA Federation Development and Execution Process (FEDEP) from requirement definition to execution and analysis in developing the federation of Service-sponsored analytic simulations. Member federates included the Army's *Extended Air Defense Simulation* (EADSIM) exercised from the Air Force's Electronic Systems Center, the *Naval Simulation System* (NSS) from the Navy's Space and Naval Warfare Systems Command, and *Eagle* from the Army's Training and Doctrine Command (TRADOC) Analysis Center, or TRAC.

The federation development represented a partnership between the Defense Modeling and Simulation Office (DMSO), Air Force, Army and Navy to apply a federation of simulations to a joint experiment in support of Joint Vision 2010.

The *Trailblazer* team developed a Federation Object Model (FOM) that reflected the specific requirements for the JSEAD experiments, then adapted the simulations to execute cooperatively using the HLA. The experiment and scenario were developed and documented to provide a basis for proper analysis. All of the activities occurred over a period of five months, culminating in the execution of the federation in September and demonstration of its capabilities in late October.

Separately from *Trailblazer*, the Joint Staff J-6 executed ISX 1.1 using live systems in September. Based on the initial success of *Trailblazer*, the Joint Staff and U.S. Atlantic Command (USACOM) will partner with the DMSO to use the *Trailblazer* federation to supplement live data in the next phase of ISX 1.1 analysis. To support this use, the *Trailblazer* team is cooperating with the Joint Staff and USACOM to accommodate new experiment excursions, expand the types and numbers of systems and organizations represented in the federation, and to replace notional data with user-approved data.

Trailblazer is a congressionally funded JWP under the direction of the DoD's Director of Defense Research and Engineering. The program will be executed over a period of five years through the conduct of a series of ISXs designed to coevolve technologies, doctrine and organizations to achieve information superiority of U.S. military forces. Modeling and simulation applications relying on the HLA will support a number of these exercises.

The *Trailblazer* facilities are available for other interested users. For additional information contact Anita Zabek at 703-883-1389 or anita@mitre.org.

JTLS-GCCS-NATO C2 Federation

Multinational partner project successfully interfaces C2 systems and simulations

By Marnie Salisbury
C2 Federation Experiment Manager

A multinational partner project to support interfaces between command and control (C2) systems and simulations achieved a significant milestone in September when it successfully linked the two technologies in a demonstration for representatives from the participating organizations.

The demonstration of the U.S. Department of Defense (DoD) High Level Architecture (HLA) federation execution responsible for the success was the culmination of a six-month effort.

The partners in the project were the Defense Modeling and Simulation Office (DMSO), the Defense Information Systems Agency (DISA), the Joint Warfighting Center (JWFC) and the North Atlantic Treaty Organization (NATO) Consultation, Command and Control Agency (NC3A).

The DMSO-DISA-JWFC-NC3A C2 federation consisted of a set of C2 systems — the U.S. Global Command and Control System (GCCS) and NATO's Initial Combined Air Operations Centre (CAOC) Capability (ICC) Air Track display — and exercise support tools, stimulated by the Joint Theater Level Simulation (JTLS).

The partnership brought together three organizations (DISA, JWFC and NC3A) with a vested interest in finding affordable and extensible approaches to the task of linking combat simulations to fielded C2 systems to support training. The DMSO joined the partnership to provide the HLA, the enabling technology that serves as the foundation for linking command, control, communications, computers and intelligence (C4I) systems to simulations.

Within the federation, the JTLS, the sole combat simulation, modeled all ground, air, and naval units and behaviors. The JTLS provided simulation state data for those units to all interested federates. Each federate then processed the incoming data appropriately to provide stimuli to the training audience in a variety of ways. For

See JTLS-GCCS-NATO C2, p. 7

Tools demo at I/ITSEC

DMSO, Industry partner to develop HLA tools

By Chris Turrell
DMSO HLA Staff

The Defense Modeling and Simulation Office (DMSO) has partnered with industry to identify a Department of Defense (DoD) High Level Architecture (HLA) tools suite designed to support end-to-end HLA federation development-through-execution process. This key milestone in support of HLA implementations will be demonstrated at the Interservice and Industry Training, Simulation and Education Conference (I/ITSEC) in Orlando, Nov. 30 through Dec. 3.

Although the HLA is a technical architecture for modeling and simulation (M&S), not software, the DMSO recognized from the outset the requirement to facilitate the cost-effective transition of simulations to the HLA by developing an initial suite of supporting tools and services. These tools and services are based on a well-documented tools architecture designed to support automation of the Federation Execution and Development Process (FEDEP). Visit the HLA web site at *http://hla.dmso.mil/* and look under the *Federation Development Processes and Tools* topic for FEDEP documentation.

The DMSO also continues to provide open access to the HLA specification to encourage government and commercial tools development.

Indications of this growing partnership between government and industry were evident late this summer when the DMSO invited industry review and comment on one of the key data interchange formats (DIFs) supporting the automated exchange of data between Object Model development tools. The effort was announced at the DMSO-sponsored HLA tools workshop in July. During the workshop Col "Crash" Konwin, DMSO Director, and Dr. Judith Dahmann, DMSO Chief Scientist, openly discussed the government's philosophy of providing only the tools necessary to support early implementations and challenged industry participants to "drive the DMSO out of the HLA tools development business."

In a separate effort also related to DIF development, the Architecture Management Group (AMG) of the DoD Executive Council for M&S (EXCIMS) is moving to adopt the industry standard XML. A reference specification of the World Wide Web Consortium, XML offers both a means of defining the structure of the DIFs and an efficient way to transmit this structure data among HLA tools. Industry leaders in the development and implementation of XML products are looking over the DMSO's shoulder and offering their review of the DMSO's work in this evolving area.

New HLA Tools

Early HLA tools developments, including the Object Model Data Template, Object Model Library and Object Model Data Dictionary, focused on providing automated support to the federation execution and development process. A new set of HLA tools that further strengthens this development process and also support the runtime execution of the federation, including the analysis of the federation results will also debut at the I/ITSEC. These tools include:

• *Federation Execution Planners Workbook (FEPW) tool.* The FEPW tool automatically populates FEPW tables from data contained in the Object Model Data Template. An automated consistency-checking feature aids in the elimination of errors and speeds the overall process.

• *Runtime Infrastructure (RTI) Initialization Data (RID) Editor tool*. One of the steps to be taken prior to actual federation execution is the generation of the RID file. The RID Editor tool produces a default RID and also permits editing the RID within safe parameters to optimize federation performance.

• *Federation Management Tool*. During runtime, a Federation Management Tool provides runtime monitoring of federation and federate data and allows control of a federation execution through the standard Management Object Model (MOM) services provided by the HLA interface specification.

• *Federation Verification Tool*. The Federation Verification Tool supports federation execution by insuring that each federate is meeting its data exchange responsibilities.

• *Data Collection Tool*. Finally, a key element associated with simulations is the requirement to collect and analyze simulation data. The Data Collection Tool permits analyst to selectively identify and log their data collection requirements and then to store and display that data using COTS products.

Each of these tools is being developed by a commercial vendor under the sponsorship of the DMSO.

See HLA Tools Suite, p. 5

• HLA Help Desk •

Have a question about the HLA? Send your query to the HLA Help Desk at **hla@msis.dmso.mil**. We'll sort it out, send your question to the right people and get you an answer.

JTLS-GCCS-NATO C2

Continued from p. 6

example, the GCCS used incoming data about ground unit location and status to update the Common Operational Picture. The Over the Horizon (OTH)-Gold External Module federate transformed incoming data about air and naval surface tracks to generate standard OTH-Gold messages which it then passed to the GCCS over the HLA Runtime Infrastructure (RTI). The ICC Air Track Formatter transformed incoming data about air tracks into ICC Air Track messages that it broadcasted to ICC Air Track display devices on the network.

The federation was developed over a six-month period, following the basic process defined in the HLA Federation Development and Execution Process (FEDEP). The federation team developed a Federation Object Model (FOM), now available online in the Object Model Library (OML) at *http://www.omlibrary.epgc4i.com/*. The successful demonstration was achieved after completing three one-week federation integration tests over a three-month period. At these integration tests, software engineers from the full set of federates (or a subset) met at a central location and ran their software together as a federation multiple times. During the test runs, the software engineers looked at the way each federate used the services provided by the RTI and the data exchanges between the federates.

The federation, comprised of 11 individual federates, executed a small JTLS scenario for the September demonstration. It used the HLA Interface Specification 1.3 and ran with RTI 1.3 software, the open access RTI software provided by the DMSO.

For more information contact Marnie Salisbury at 703-883-7064 or *marnie@mitre.org*.

DATA ENGINEERING

CMMS Resource Center offers newly expanded, refined, more useful toolset

By Tom Johnson
CMMS Toolset Project Manager

The Conceptual Model of the Mission Space (CMMS) Resource Center, always a critical "first stop" for conceptual modelers and simulation developers, has increased its usefulness with recent improvements in the CMMS Toolset.

The World Wide Web-deployed CMMS Resource Center and tools provide a common starting point for constructing consistent and authoritative modeling and simulation (M&S) representations, which facilitates interoperability and reuse of simulation components.

The CMMS Toolset Project, a Defense Modeling and Simulation Office (DMSO) effort, completed its second six-month development cycle in early September. The toolset was significantly refined and expanded, making it more useful in the direct support of key Partner Simulation Programs such as the Joint Simulation System (JSIMS) and Joint Warfare System (JWARS). Explicit requests for training by programs such as JSIMS and JWARS, and the recognized utility of the CMMS Toolset for these important simulation programs, prompted the DMSO to establish CMMS training courses to meet the need.

The CMMS Library allows user-tailored views of the library and associated tools that have a variety of browse, locate, export, and report features to access and use Mission Space Model (MSM) data. The library, which now contains data for over 40 MSMs, stores atomic model elements so they can be combined into views supporting diverse users and their specific analytic and programmatic needs. A "hierarchical" view is available that presents a "snap shot" of a model's behaviors and associated decompositions. A "functional" view is also available that allows an analyst to display detailed information concerning a model's explicit process or entity. Here an analyst can view data concerning a process' input and output, allocation, behavioral controls and conditions, as well as its parents and children.

New JSIMS and JWARS Mission Space Data "Converters" Deployed

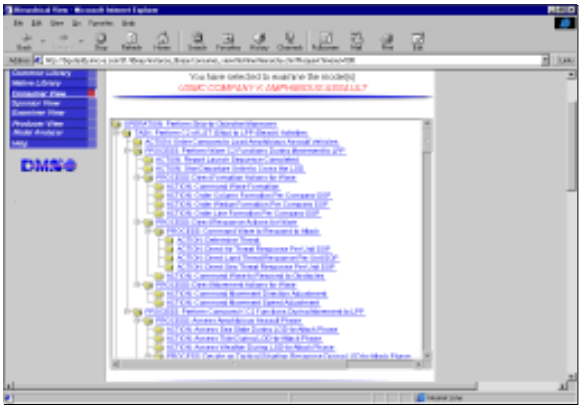
A central feature of the CMMS is its ability to capture conceptual or mission space models produced by major Partner Simulation Programs like JSIMS and JWARS. Converters provide automated support for translating JSIMS and JWARS data from their "native formats" into CMMS Library data structures. A CMMS Intermediate File Format provides a standardized intermediate form between heterogeneous native formats and the CMMS Library. Tests for referential integrity, common semantics and syntax (CSS) and the identification of redundant entities and processes are performed on the data during the conversion and integration process.

The latest CMMS development cycle completed the development of converters which "tag" and parse both JWARS and JSIMS MSM documents and data such as JSIMS Formalized Data Products (FDPs) and JWARS Joint CMMS (JCMMS) documents and loaded them into the CMMS Library. Using *Lex* and *Yacc*, *Visual Basic Applications*, *C* and an extensive application program interface (API) library, the converters translate free-text MSM documents according to explicit business rules and load the data into the CMMS Library's Oracle database. Once the information is in the database other developed tools export this information into a variety of formats for reuse by users.

Data Exchange between JSIMS and JWARS Programs

The most recent version of the CMMS Toolset contains export routines and document "builders" that promote the seamless exchange of data between JSIMS and JWARS programs. New CMMS tools have been deployed that allow a user to select data from the CMMS Library and export it in the form of JSIMS FDPs and JWARS JCMMS documents. These tools allow for the direct reuse of data between these programs in formats they presently use. This CMMS functionality has the potential to save them valuable development time and resources in their respective knowledge acquisition (KA). At a recent DMSO-sponsored meeting between the CMMS Development Team and JSIMS personnel, initial procedures were established for the potential use of JWARS data by JSIMS KA agents and mission space modelers.

The CMMS Resource Center also contains a new facility that allows users to generate, download and save a growing number of specialized reports concerning mission space data. For example, a CMMS user can generate and download reports for a particular MSM concerning all processes or behaviors that model entities can perform for a given military domain.



A Hierarchical View of a CMMS Model

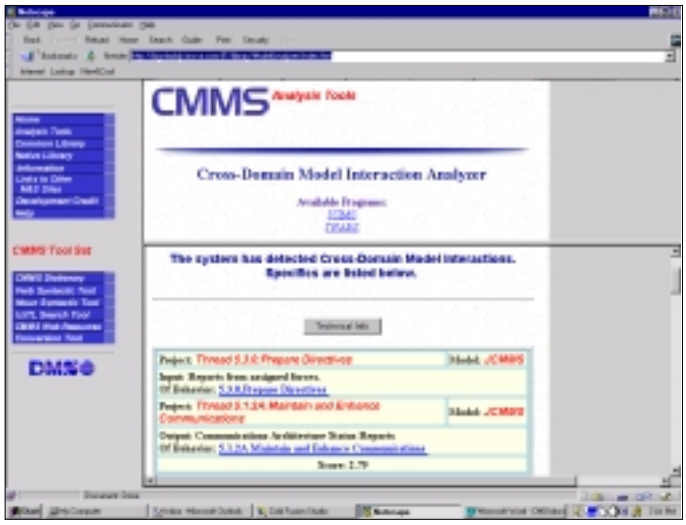
New CMMS Analysis Tools

New tools have been provided to facilitate the study and reuse of MSMs and the creation of new ones. CMMS users can now perform semantic searches of data in the CMMS Resource Center to locate specific behaviors or entities of interest. Equivalent searches can be performed for other MSM data elements such as behavioral inputs and outputs, triggers (or behavior initiating conditions) and exit criteria, etc.

See CMMS Tooset, p. 9

CMMS Toolset, *Continued from p. 8*

In addition, analytic tools are available that allow users to identify cross-domain model interactions. Fuzzy logic algorithms and search methodologies allow a user to easily identify structures of disparate models that may indicate an explicit area where models can be integrated. This tool is especially valuable for enterprise simulation programs like JSIMS where considerable analyst time is spent in the identification of "cross-DA" interactions. The JSIMS CMMS user can now search for pairs of JSIMS models (or FDPs) with similar inputs or outputs, allocations or entities. Similar searches can also be mounted within a model to locate intra-model interactions.



CMMS Cross-Domain Model Interaction Tool

New CMMS V&V Tools

A series of CMMS verification tools have also been developed that can help assess or verify the internal integrity of MSMs. For instance, one CMMS verification tool identifies model behaviors that have outputs that are not received as inputs anywhere else in the model, as well as behaviors which call for inputs that no other behavior or entity within the model provides. Parent behaviors or entities with no children, and vice versa, can be located, as well as behaviors without allocations. All of these tools aim to assist analysts in the assessment of models.

Another CMMS tool automatically finds redundant elements within a model. It can be used to ensure that models have been formulated with consistent semantics.

Expanded CMMS dictionaries

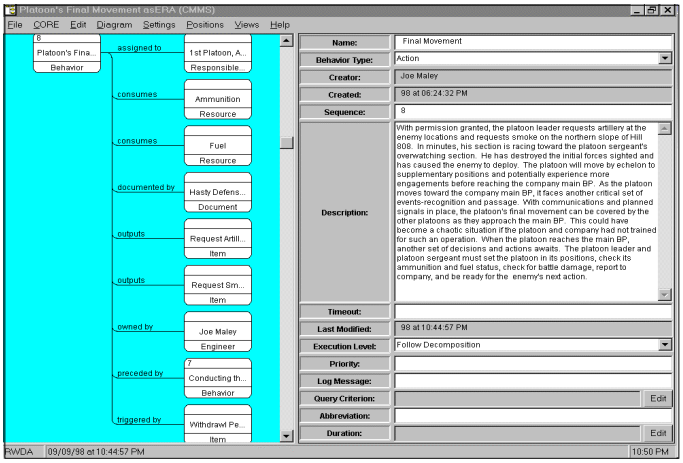
Expanded CMMS Dictionaries

The latest CMMS Toolset has also expanded dictionaries and lexicons to include definitions and data on over 13,000 military terms. The CMMS dictionaries are among the most comprehensive military dictionaries deployed on the Internet. The dictionaries have been upgraded to include hot links to originating sources and the data of "fact sheets." The CMMS dictionary system is an invaluable source of open-source materials on military processes, entities and organizations.

CMMS Forum

In order to provide feedback to the administrators of the CMMS Toolset, a User Forum has been provided. The main features include a facility to send comments to the CMMS Project team via email, a calendar of events of interest to CMMS users, a set of Frequently Asked Questions to guide new users, a library of project documents, and a quick evaluation form for the Toolset.

CMMS Knowledge Acquisition Tool



CMMS Tool Object View

Finally, the CMMS Toolset has deployed a "beta" version of a KA tool, called the KAT, that can be used by mission space modelers in the compilation of MSM data. The tool, which is not tied to any particular simulation program or methodology, provides a KA Definition Language, structure, consistency and discipline, and enhances communication among all KA participants. The KAT provides a direct import and export capability to the CMMS Library and uses a judicious mixture of textual and graphical aids to capture and present knowledge.

The KAT allows the user to represent data from an object, hierarchical and text view. The tool also provides several approaches for gathering data, such as direct entry, semi-automated extraction from an electronic file and automated parsing of an electronic file.

When used in conjunction with other aspects of the CMMS Toolset, the KAT tool provides cradle-to-grave support of mission space modeling.

The CMMS Toolset can be found online in the CMMS Resource at *http://38.241.48.9/*.

For more info...

For more information about the CMMS Toolset project contact:

Michael Loesekann, DMSO CMMS Lead
(703) 824-3432
mloeseka@msis.dmso.mil

Tom Johnson, CMMS Toolset Project Manager
(703) 318-8044, ext. 205
tjohnson@imcva.com

Dictionary key resource for mission space modelers

By Bruce Harris
CMMS Data Dictionary Project Manager

As the goal of allowing mission space model (MSM) developers to employ their preferred modeling methods comes closer to fruition, the Conceptual Models of the Mission Space (CMMS) project has spawned a number of complementary efforts, providing developers with tools to instantiate the Entity-Action-Task-Interaction (EATI) representation.

Unchanged, however, is the requirement for consensus on the data to be entered into the EATI representation for interoperability. That is why the Defense Modeling and Simulation Office (DMSO)-sponsored CMMS Data Dictionary, one of those complementary efforts, has become a key resource for mission space modelers.

Since the latest CMMS production version supports multiple methodologies and a variety of commercial-off-the-shelf (COTS) tools, the CMMS needs more than ever to specify more than just a lexicon in a data dictionary. Consequently, the current CMMS Common Semantics and Syntax (CSS) has been further refined.

• It is now composed of a lexicon (dictionary) embedded in a domain-specific taxonomy, common representation templates (for the EATI components) and Computer Aided Software Engineering (CASE)-tool-specific style guides. The need to further examine the issue of taxonomies and the potential for tailoring taxonomies for specific modeling and simulation (M&S) programs has also been recognized.

• CMMS lexicon and domain-specific taxonomy is composed of nouns-to-name entities and attributes, verbs, and process-to-name processes, tasks, and actions. A number of additional or alternative naming conventions and taxonomies are being investigated.

• The lexicon and taxonomy are derived from over 650 authoritative data sources (ADS), such as Joint Publication 1-02. An additional 150 data sources are under review and over 1200 lexicon items have been identified as CSS candidates from the terrain, air and space, and ocean domains.

• An analysis of the Department of Defense (DoD) Data Dictionary System (DDDS) is underway to map and match CMMS-CSS terms where possible.

• Recommended "common data elements" are being selected based on business rules addressing the key features of the CSS, Object Model Data Dictionary (OMDD) System, and the DDDS.

An overview of the CMMS Data Dictionary project can be found in the article, "CMMS Data Dictionary: Key Resource for Producing Conceptual Models," *DMSO News*, Volume 3, Number 3, available online at *http://www.dmso.mil/DMSONEWS/archive.html*.

CMMS-DD Issues Update

CMMS MSMs will eventually feed DoD High Level Architecture (HLA) Federation Object Model (FOM) and Simulation Object Model (SOM) development. Because the CMMS-CSS and the HLA-OMDD need correlated and consistent content the DMSO-sponsored Data Analysis and Reconciliation Tool (DART) is being used to map and match lexicon items as appropriate.

CMMS-CSS content, critical to the CMMS Technical Framework Toolset integration procedure, has been verified and validated (as of June 1) by appropriate military operations subject matter experts. Further, appropriate CSS content has been shared with the Air Force's National Air and Space [Warfare] Model (NASM) and the Army's Warfighters' Simulation 2000 (WARSIM) programs. Knowledge acquisition is ongoing to fill in missing data. Both programs are building CMMS MSMs and should be HLA compliant.

Because the DDDS does not support HLA and CMMS needs as presently constituted and filled, concrete recommendations are being made for modifying and improving it.

Where We Are

A Data Dictionary Requirements Analysis and formal Verification and Validation (V&V) Plan were submitted in May. Identification of doctrine and systems relevant to WARSIM and NASM was completed in June. Formal V&V of the references used in the existing CSS database was completed in July and V&V of the lexicon items was completed in August. The fill of missing lexicon items was just accomplished in October.

As a review, the Data Dictionary Requirements Analysis examined eight WARSIM and NASM Formalized Data Product (FDP) types and determined that 19 of 23 data elements used in WARSIM and 26 of 31 data elements in NASM could benefit from tailored lexicons. The doctrine and systems analysis also identified additional potential User Groups for DMSO products (CMMS CSS, Order of Battle Data Interchange Format, ADS, etc.) and was able to identify doctrine requirements specific to WARSIM and NASM, plus an additional category supporting cross-domain interactions.

The V&V process was supported by a Microsoft *Access*-based tool which used a variety of forms to capture V&V information and store it in a database. The use of drop-down list boxes, enforcement of business rules, and support for "Filtering" and "Queries" greatly increased productivity and promoted accuracy and completeness. The success of the *Access*-based V&V tool led to the creation of a similar tool for fill of new lexicon items.

Three domain-focused tools were produced to support air, ground and sea subject matter experts capturing new lexicon knowledge. As noted earlier, over 1200 new lexicon items have been entered, each on a separate entry form, which facilitates traceability and promotes accuracy. The resulting *Access* database files are exported to the production model of the CMMS.

CMMS DD Program Partners

The DMSO is working closely with the NASM and WARSIM programs to better understand the need for and provide solutions to meet lexicon requirements. In addition, other DMSO contractor efforts such as COLSA Corporation's *Eurisko* web search tool

and work on a Multiple Browser Taxonomy, and the OMDD produced by the Applied Research Laboratories at the University of Texas at Austin are being brought to bear on the CMMS Data Dictionary. M&S community involvement is critical for the development of a data dictionary that meets its needs.

Where We Need To Go

Given that there has to be use before there can be reuse, every effort is being made to encourage use of the lexicons by participating M&S programs. "Use before reuse" remains the watchword for CSS. New 1999 efforts will evaluate existing taxonomy sufficiency and applicability, research and develop M&S approved taxonomies, map and match existing taxonomies to M&S taxonomies, and continue lexicon-fill activities. Lastly, DMSO liaison activities will be expanded and other M&S programs added to the liaison program.

For more information about the CMMS Data Dictionary Project contact:

Michael Loesekann, DMSO CMMS Lead
(703) 824-3432
mloeseka@msis.dmso.mil

Bruce Harris, CMMS Data Dictionary Project Manager
(978) 475-9090, ext. 1878
bharris@drc.com

DMSO works with JSIMS JPO to build better KAT, Enterprise programs beta test incremental versions

By Cynthia Tuttle, KAT Project Leader,
and Dr. Lawrence O'Brien, KAT Program Manager

The Defense Modeling and Simulation Office (DMSO) is working together with the Joint Simulation System (JSIMS) Enterprise community to build a better *KAT – Knowledge Acquisition Tool*.

Various Enterprise programs are beta testing incremental versions of the KAT, a type of development-and-capture tool within the DMSO-sponsored Common Model of the Mission Space (CMMS) Toolset Architecture.

The Air Force's National Air and Space [Warfare] Model (NASM) program has completed its "beta" testing and is currently using the KAT for its knowledge acquisition efforts. The Army's Force XXI program is currently beta testing a newer version of the KAT for potential use by the Warfighters' Simulation 2000 (WARSIM) program.

In addition to JSIMS Enterprise, Air Force and Army programs, the Navy's Air Combat Environment Test and Evaluation Facility (ACETEF) is also beta testing the KAT with its Simulated Warfare Environment Generator (SWEG) threat scenarios. All beta test participants are providing feedback and suggestions for enhancement to the KAT developers for incorporation in future versions of KAT. Modeling and simulation (M&S) community involvement is critical for the development of a tool that meets their needs.

CMMS Resource Center

The DMSO has developed the CMMS Resource Center, home to the CMMS Model Library, that provides a common starting point from which simulation developers can browse through, analyze and extract existing models relevant to their simulations. Models are imported to or exported from the CMMS Repository via the CMMS Data Interchange Format (DIF). Simulation programs are responsible for creating the models that go into the CMMS Repository. The CMMS KAT provides simulation programs with an economical means of producing models in compliance with the CMMS DIF for import into the CMMS Repository.

As a development-and-capture tool the KAT assists subject matter experts and Knowledge Engineers in gathering mission space information for their mission space models (MSMs) during knowledge acquisition. An overview of the KAT is available in the article, "Beta Testers Line Up for New KA Tool", *DMSO News*, Volume 3, Number 3, online at *http://www.dmso.mil/DMSONEWS/archive.html*.

CMMS KAT Features

The current version of the KAT supports JSIMS and the Army's Warfighters' Simulation 2000 (WARSIM) Formalized Data Product (FDP) production. The KAT collects the same data that is collected by the FDP templates, as well as automatically generating *Microsoft Word* Documents in the FDP template format. This FDP data is stored in a *Microsoft Access* database that can be queried and exported.

KAT Supports Data Quality and Efficiency

The KAT has additional features that support data quality and promote efficiency. These features include:

- *Data Quality Examiner*. This feature allows the user to run queries that automatically inspect models for various data quality errors. The list of flagged models is presented to the user as hyperlinks that can be clicked on to correct the error. This feature assists users in weeding out problems early, before the model is submitted for verification and validation (V&V).
- *Support for pictures*. Paragraphs are very often accompanied by a diagram that assists in describing the concept.
- *Support for authoritative data sources (ADS)*. Simulation programs are required to document where they get their information.
- *Enforcement of business rules*. A new record may not be created unless all mandatory fields are completed.
- *Supports Filtering and Queries*. Users may search for and view only the information in which they are interested.
- *Reduction of data re-entry.* Data that appears multiple times can be selected from drop-down lists after being entered once.
- *Extendable*. Input forms and output formats may be tailored for particular users.

CMMS KAT Benefits

- *Low cost alternative to CASE tools*. The KAT can be released as a royalty-free application.
- *Supports quality assurance*. Enforcement of business rules promotes accuracy.
- *Increases productivity*. KAT graphical user interface (GUI) forms reduce typing. Users don't have to worry about making pretty documents; they can concentrate on just filling in the data.
- *Raises potential for reuse*. Export to the CMMS DIF will make the data available for other purposes through the CMMS Model Library and integration and analysis tools.

Looking Ahead

In 1999, the CMMS KAT functionality will be extended to include:

- Support Joint Training System DIF
- Additional Import/Exports
- Additional Quality Control Checks/Reports
- Additional Administrative Features
- Hardware/Software Requirements

KAT is a *Microsoft Access 97* application and can be released with a run-time version of *Access*, eliminating the need to purchase a separate license for *Access*. However, if you wish to generate the *Word* 97 FDPs, you are required to have *Word 97* installed on your machine.

Equipment Requirements

The general requirements for KAT are the same as for *Microsoft Office 97*. However, we recommend the following minimum specifications for acceptable performance:

- *Pentium* 200+ CPU
- 64+ MB RAM
- 800x600 or finer video resolution
- *Windows 9x* or *NT Workstation 4.0+*

For more info...

For more information about the CMMS KAT Project contact:

Jack Sheehan
DMSO CMMS Technical Director
(703) 824-3448
jsheehan@msis.dmso.mil

Michael Loesekann
DMSO CMMS Lead
(703) 824-3432
mloeseka@msis.dmso.mil

Dr. Larry O'Brien
CMMS KAT Program Manager
(978) 475-9090 x1221
lobrien@drc.com

Cynthia Tuttle
CMMS KAT Project Lead
(407) 380-1200
ctuttle@drc.com

ADS helps reduce KA expenses

Costs of doing knowledge acquisition old fashinoned way no longer acceptable

By Dave Kendrick, ADS Deputy Project Manager
and Michael Hopkins, ADS Project Manager

Knowledge acquisition (KA) requirements are expanding and the expenses associated with doing business the old fashioned way are no longer acceptable. Accordingly, the Defense Modeling and Simulation Office (DMSO)-sponsored Authoritative Data Source (ADS) project is rapidly gaining recognition as the means to reduce the resource costs associated with KA.

Fiscal Year 99 work will bring several new enhancements to the ADS project as it continues to populate the catalog of data and knowledge sources known as the ADS Library. The library is enhancing its metadata set to capture those elements of data-quality information necessary to support identification of sources, determination of appropriateness for the need, and Verification, Validation and Accreditation (VV&A) by the user. Another critical enhancement to be incorporated this FY will be the ability to register a new data/knowledge source and to do periodic updates of library metadata representations on line, ensuring currency of the library.

"Partnering" with key players in the modeling and simulation (M&S) community has been good for the ADS project team. Almost daily exchange of information and ideas between ADS project leaders, ADS Working Group members, other DMSO projects, numerous other government representatives, and the prime contractor, Veridian, is further synchronized with the work of the DMSO's Conceptual Models of the Mission Space (CMMS) project, key Service M&S programs like the Joint Simulation System (JSIMS) and Joint Warfighting System (JWARS), and ADS tool developers.

Service M&S offices are also partners in the effort. The successful launch of the ADS Library, a critical piece in the Department of Defense (DoD) M&S Common Technical Framework, has been a direct result of this diverse partnership between producers, repositories and users of the data.

The ADS project team, the Master Environmental Library (MEL) project team and the VV&A Working Group, all DoD-sponsored M&S groups, have been striving to standardize guidelines for the metadata representations that a producer should maintain. This has been done using standard terminology from the Department of Defense Data Dictionary System (DDDS). Further, a request has been sent to the Geospatial Standards community of the International Standardization Organization (ISO) to include certain additional metadata elements and to modify current terminology and definitions of other elements within the ISO standard to assist MEL sources in cross-domain standardization.

In November the ADS Library contained 1061 sources. Additional candidates for inclusion in the library are identified daily. Sources represent a wide selection of functional areas and come from the DoD, other Federal Government agencies, and foreign and commercial interests. The library is available at the unclassified level on the Modeling and Simulation Resource Repository (MSRR) at *http://ads.msrr.dmso.mil*. The ADS Library will soon be available on the Secret Internet Protocol Routing Network (SIPRNet).

The M&S Working Group (MSWG), a subordinate policy working group of the DoD Executive Council for M&S, recently revalidated the need for the ADS Working Group and its associated projects for another year.

For more information about the DMSO Authoritative Data Sources Project contact:

Michael Hopkins
DMSO ADS Project Manager
(703) 824-3432
mhopkins@msis.dmso.mil

Dave Kendrick
ADS Deputy Project Manager
kendrick@hampton.veda.com

RRIE

Continued from p. 14

apply current M&S technology to the design, optimization, and validation of vehicle features and functionality.

The RRIE project assisted the GDAS M&S team by conducting simulations of the AAAV operating during different sea state conditions.

The Camp Pendleton coastal region served as the setting for the simulations. This region was selected because high-resolution bathymetric data are available and the AAAV operational testing and evaluation will occur there. The computer simulations were conducted in mid-November at the AAAV Technology Center in Woodbridge, VA.

Partnerships

The partnerships developed during the RRIE among the end users like the NWC, the Grizzly PM, and the AAAV PM; the simulation developers; and the DoD Research and Development Laboratories will significantly enhance the wargaming and acquisition communities' ability to capture the effect of the environment on operations and systems performance.

Registraion Template

Continued from p. 13

Organization's (BMDO) Virtual Data Center, the Joint Data System of the Program Analysis and Evaluation (PA&E) directorate in the Office of the Secretary of Defense (OSD), the Department of Defense (DoD) High Level Architecture (HLA) Object Model Data Dictionary and the HLA Object Model Library.

Each iteration of the CMMS-RT creates a Data Interchange Format (DIF) package and a data dictionary using the Data Analysis and Reconciliation Tool (DART). The DIF package consists of the logical template, physical data structure and the set of business rules.

The interoperability made possible by the implementation of the CMMS-RT is enhancing the capabilities of other DMSO projects. These DMSO partnerships include the Knowledge Acquisition Tool (KAT), Common Semantics and Syntax (CSS) library and the Authoritative Data Sources (ADS) library.

The CMMS-RT has been implemented with a web search tool known as *Eurisko* (a Greek word for search). This tool provides the user the ability to search multiple CMMS-related repositories for registered models. One of its features is a multiple-taxonomy search capability.

Look for a demonstration of the CMMS-RT at the DMSO exhibit, booth # 819, at the Interservice and Industry Training, Simulation and Education Conference (I/ITSEC) in Orlando, Nov. 30-Dec. 3.

UOB DIF owes success to partnerships

By Michael Hopkins
UOB Project Manager

The Unit Order of Battle (UOB) Data Interchange Format (DIF) project owes its success to "partnerships."

The Defense Modeling and Simulation Office (DMSO)-sponsored project requires almost daily exchange of information and ideas between the prime developer, Applied Research Laboratory at the University of Texas at Austin, and numerous government representatives, such as the Directorate for Program Analysis and Evaluation (PA&E) in the Office of the Secretary of Defense (OSD), the Defense Intelligence Agency (DIA), the National Ground Intelligence Center (NGIC) and other DMSO project leads.

The UOB DIF project stays in synch with the DMSO-sponsored Authoritative Data Sources (ADS) and Conceptual Models of the Mission Space (CMMS) projects, and key modeling and simulation (M&S) programs, such as the Joint Simulation System (JSIMS) and the Joint Warfare System (JWARS), through interchange with project contractors, Service M&S offices and ADS tool developers.

Task Organizing Simplified

The Unit Order of Battle Data Interchange Format (UOB DIF) concept consists of three main components: a library of UOB sources, a data access tool (DAT), and a data interchange format (DIF).

The library of UOB authoritative data sources consists of Foreign and U.S. Forces, Classified and Unclassified, and current and future force structures. UOB sources are maintained by the owning organizations and made available to the UOB DAT in their native formats to the maximum extent possible.

The UOB DAT features a graphical interface that allows users to retrieve and browse order of battle data and associated information and select individual units easily and quickly across distributed networks. Selected units can be task organized; aggregated/deaggregated to desired unit levels; and unit attributes edited and used as start up data in models, simulations, and the operational, planning, training and execution systems.

The UOB DIF presents UOB information from all library sources in a single, understandable, consistent, standard format readily available over distributed networks. The UOB DIF is based on DoD standards and users can depend on this standard format for obtaining UOB data for their interfaces to models, simulations, and other planning, training and acquisition systems.

Next Steps

The UOB DIF has reached a point in maturity where it is appropriate to develop and implement a long-term strategy and information plan for its broader use as a tool by the Joint and Service communities. The potential audience for the UOB DIF — beyond its current proponents in the M&S user community — lies both in the military education system and field operating units.

The Joint Professional Military Education System and Service educational programs devote considerable time to operations and planning tasks. Joint and Service doctrines identify well-defined staff processes for both deliberate and crisis action planning and these processes are embedded in the curriculum of every level of school. Commonly referred to as the Estimate Process, this effort is necessarily time-consuming and data focused.

While commanders and staff officers are often adept at analysis at lower levels of command and are able to quickly develop task organizations to support specific courses of action at the tactical level, activities at the operational and strategic levels of war are more complex, usually Joint and combined, involving allies and non-governmental organizations. Here unfamiliar organizational structures and dissimilar manning and equipment tables challenge even seasoned commanders and staff. With its potential use in the classroom, and eventually the field, the UOB DIF will offer students, commanders and staff at all levels timely access to the real-world data they need to train as they will fight.

In Fiscal Year 99 existing force structure/operational planning tools will be analyzed and compared with emerging Joint and Service operational strategies and doctrine — *Joint Vision 2010, Concept for Future Joint Operations*, and complementary Service strategies. Current UOB DIF capabilities will be compared to these tools and baseline requirements, and adjustments will be made to the UOB DIF. Testing will commence in the U.S. Army and U.S. Marine Corps educational systems at Military Education Level 4 (captains and majors) at Fort Leavenworth, Kansas, and Quantico, Virginia, respectively. Eventually it will migrate to field operating units -- carried by there graduates of the programs.

For more info...

For more information contact Michael Hopkins at 824-3431 or *mhopkins@msis.dmso.mil*.

Project registers DMSO partners' conceptual models

By Paul Agarwal
CMMS Registration Template

The Conceptual Models of the Mission Space (CMMS) Program has an objective to register the conceptual models being developed by the major Defense Modeling and Simulation Office (DMSO) Partner Simulation Programs, which include the Joint Simulation System (JSIMS) and Joint Warfare System (JWARS).

The CMMS Registration Template (CMMS-RT) is the key to creating a system that supports the exchange of registration information among cooperating autonomous and heterogeneous partners. Each partner will develop the capability to interface with the specified common format and structure.

The CMMS-RT provides the format and content for interchange of registration metadata about conceptual models constructed by distinct organizations using different storage implementation. The registration template eliminates the need for simulation developers to understand each program's unique format for registration metadata. The CMMS-RT specification provides the mechanism for seamless interchange of metadata between partners and allows simulation developers a consistency when accessing metadata.

The CMMS-RT is being developed and demonstrated in two iterations. The first iteration includes registration requirements from the JSIMS CMMS Formalized Data Products (FDPs), and the DMSO CMMS Library. The second iteration is in progress and extends the CMMS-RT to include requirements from other CMMS-related projects. Some of these include the Army's Warfighters' Simulation 2000 (WARSIM) Functional Description of the Battlespace (FDB), the Ballistic Missile Defense

See Registration Template, p. 12

ENVIRONMENT

Experiments conducted last summer, fall

RRIE report due end of Dec.

By Gary McWilliams
DoD M&S Executive Agent for Air and Space Natural Environment

The final report on a series of five experiments – the *Representational Resources Integration Experiments (RRIE)* – that looked at coupling the Synthetic Natural Environment (SNE) to systems performance, physical data consistency issues and the levels of resolution required by simulations is due by the end of December.

Conducted during the summer and fall, the RRIE, a Defense Modeling and Simulation Office (DMSO) project, will define the reference procedures that provide physically consistent data representations of the ocean, atmosphere and terrain, and will provide a much better understanding of how to couple an integrated SNE with system performance behavior.

The RRIEs were performed from the data collected during three demonstrations: *Global 98 War Game*, the Naval War College's annual summer war game, and computer simulations of two combat systems under acquisition development – the Army's *Grizzly Breaching Vehicle* and the Marine Corps' *Advanced Amphibious Assault Vehicle (AAAV)*.

An Integrated Product Team (IPT) composed of participants from 15 government and private organizations conducted the experiments. The three DoD Modeling and Simulation (M&S) Executive Agents (MSEAs) for the Natural Environment – Air and Space, Oceans, and Terrain – coordinated the project with assistance from the DMSO project offices for systems and human behavior representation.

Each of the three demonstrations provided the RRIE project with a different environmental focus. The *Global 98* exercise highlighted the use of atmospheric data. Grizzly simulations emphasized the use of terrain and soil data. Ocean data took the forefront in the AAAV simulations.

The Master Environmental Library (MEL) resource sites will archive the environmental data gathered during the demonstrations, providing a means to conveniently access the data.

Global 98 War Game

The Global War Game is conducted annually in the summer by the Naval War College (NWC) in Newport, RI. The RRIE IPT worked closely with the Naval Training Meteorology and Oceanography Detachment (NTMOD) Newport in preparing the environmental data products needed for Global 98.

The NWC welcomed RRIE participation because it provided access to new M&S resources, such as the Weather Scenario Generator and the Cloud Scene Simulation Model, that provided the capability to generate a greater variety of environmental products in a more timely fashion.

In the past, environmental data has seen limited use in war games due to the lengthy delays encountered in accessing and processing the data.

Grizzly Breaching Vehicle

The U.S. Army Tank-automotive and Armaments Command (TACOM) is developing the Grizzly as a combat mobility system capable of conducting in-stride breaches of linear obstacles.

The RRIE collaborated with the Grizzly Program Manager (PM) and the Warfighting Analysis and Integration Center (WAIC) to develop a robust Grizzly simulation capability that used Joint Semi-Automated Forces (SAF) 2.0 software to represent the Grizzly's behavior. The simulation demonstrated how Grizzly's mobility during mine-plowing operations is affected by soil moisture conditions. Simulations were run for both dry and wet conditions. Other Grizzly simulations examined how atmospheric conditions affect the dispersion of its self-screening smokes.

The environmental setting for the Grizzly demonstration was the region encompassing the National Training Range and the Twenty-nine Palms Marine Corps Test Range in California. This region was selected because it is where Grizzly will conduct its operational testing and a high-resolution terrain database is available for that region.

The simulations were conducted in mid-November at both the WAIC and the Army's Topographic Engineering Center.

Advanced Amphibious Assault Vehicle

The U.S. Marine Corps is developing the AAAV to transport dismounted forces from ships over the horizon, through the littoral region, to a final objective ashore. The AAAV is being designed to operate in a much wider range of sea states and weather conditions than is now possible. General Dynamics Amphibious Systems (GDAS), the AAAV prime contractor, formed a team of engineers to

See RRIE, p. 12

SEDRIS benefits from partnerships, Data Model v2 scheduled for release

By Paul Foley
DMSO Environmental Representation Project Manager

The Synthetic Environment Data Representation and Interchange Specification (SEDRIS) project reaps the benefits of a successful partnering of Defense and industry players. Some evidence of that successful collaboration is the scheduled (at press time) release of Version 2 of the SEDRIS data model during Thanksgiving week.

The SEDRIS has been developed with the flexibility to satisfy current as well as future environmental data sharing needs. It supports the standard representation of, and access to, existing simulation and operational environmental databases that span the terrain, ocean, atmosphere, and space domains. Finally, it promotes increased reuse of legacy environmental databases, while remaining sensitive to the data representation needs of visual, sensor, and constructive simulation systems.

Government and Commercial Partners

Government and commercial organizations partnered in the development of the SEDRIS have provided financial support, essential staff to the project management and core technical teams, and have developed and reviewed project documentation and tools to ensure completeness and utility. See the top box at right.

SEDRIS "Associates"

The SEDRIS development project also includes a unique collection of government technical experts and contractors participating in an "associate" arrangement designed to focus best available talent on data model and support software design. See the bottom box at right.

SEDRIS *Associates* perform the following roles in defining components of the SEDRIS interchange mechanism:

— Learn to "speak SEDRIS." Language of the data representation model development is "object-oriented" using an enhanced Rumbaugh notation.

— Generate a "mapping document" for their internal format(s) or assigned government format(s) that ensures the data representation model can handle all data requirements.

— Develop software to "convert" "native data" into the SEDRIS data model – then convert back and compare results to ensure no information loss.

— Participate in SEDRIS Associates meetings and designated interchange experiments to exchange ideas and cooperatively define and develop SEDRIS critical components.

— Make available to other associates all non-proprietary utilities and applications that support SEDRIS interchange.

SEDRIS Government Partners' Responsibilities

Responsibilities of Government SEDRIS partners include:

— *The Defense Modeling and Simulation Office (DMSO)* is the resource sponsor for the SEDRIS project. The DMSO environmental office focuses project direction with program management executed through the designated environmental Department of Defense (DoD) Modeling and Simulation Executive Agents (MSEAs).

— The NIMA's *Terrain Modeling Project Office (TMPO)*, lead MSEA office for the SEDRIS project, prepares, submits, and manages the annual budget in coordination with the other environmental MSEA staffs.

— The Navy's *Executive Agent for Ocean (OEA)* provides a representative to the SEDRIS management team to ensure that the data model is complete and covers the full spectrum of requirements for oceanographic environmental data.

— The Air Force's *Executive Agent for Air & Space Natural Environment (ASNE)* MSEA provides a representative to the SEDRIS management team to ensure that the data model is complete and covers the full spectrum of requirements for air and space environmental data.

— The *DARPA* provides support to the SEDRIS project through the Information Systems Technology Office Program Manager for Synthetic Environments (PM-SE). PM-SE provides personnel resources for both the management and development of SEDRIS project deliverables, as well as augments the contracting support provided by the STRICOM.

— The Army's *STRICOM* provides technical oversight and contract management support to the SEDRIS project. The STRICOM receives support from both internal assets (Engineering and Contracts) and external agencies (NAWC-TSD).

For more information visit the SEDRIS web site at *http://www.sedris.org/*.

SEDRIS Government and Commercial Partners

- Armed Forces Training Systems, Incorporated (AFTS)
- Defense Advanced Research Projects Agency (DARPA)
- Defence Evaluation and Research Agency (DERA, United Kingdom)
- Defense Threat Reduction Agency (DTRA)
- Dismounted Warrior Network (DWN)
- Institute for Defense Analyses (IDA)
- Joint Simulation System (JSIMS) Joint Program Office
- Master Environmental Library (MEL) Project
- The MITRE Corporation
- National Imagery and Mapping Agency (NIMA)
- Naval Air Warfare Center Training Systems Division (NAWC-TSD)
- Naval Oceanographic Office (NAVOCEANO)
- Orion Development Group, Incorporated (ODG)
- U.S. Army Simulation, Training and Instrumentation Command (STRICOM)

SEDRIS "Associates"

- AcuSoft, Incorporated
- Analysis and Technology, Incorporated (A&T)
- Centric (formerly Coryphaeus) Software, Incorporated (CSI)
- Evans and Sutherland (E&S)
- Litton/TASC
- Lockheed Martin Tactical Defense Systems (LMTDS)
- Environmental Systems Research Institute (ESRI)
- MultiGen-Paradigm, Incorporated
- Naval Research Laboratory (NRL)
- PAR Government Systems Corporation
- Raytheon Systems Company
- Reality By Design Government Systems, LLC (RBD)
- Science Applications International Corporation (SAIC)
- Silicon Graphics, Incorporated (SGI)
- SRI International
- Thomson Training and Simulation (United Kingdom and France)
- Prospective future SEDRIS Associates: STN ATLAS Elektronik GmbH (Germany) and Sogitec (France)

US, Sweden sign MOU to develop PfP Sim Network

By Directorate for Defense Information
Office of the Assistant Secretary of Defense for Public Affairs

Secretary of Defense William S. Cohen and Swedish Minister of Defense Bjorn von Sydow signed a memorandum of understanding at a Pentagon ceremony on Nov. 18 concerning cooperation in the development of a Partnership for Peace (PfP) Simulation Network.

The PfP Simulation Network will help to enhance the Partnership for Peace program by strengthening command and staff planning among both partners and allies. By conducting combined joint task force training on a distributed basis, it will improve interoperability by involving a wider training audience at less cost. Implemented through remote-site command posts that are multinationally staffed, the PfP Simulation Network will not only improve staff procedures, but it will also enhance the multinational cooperation that is essential to effective multinational operations like those ongoing in Bosnia-Herzegovina and Kosovo.

The PfP Simulation Network will be demonstrated during the Washington summit in April 1999 as one part of our vision to provide a foundation for PfP in the 21st Century. In order to develop fully PfP as an independent framework for European security, an end in itself, we have begun to examine new ways to help partners lead in creating a cooperative security network.

Sweden is at the forefront in developing computer simulations to support staff training in peace support operations. As a result, the United States and Sweden anticipate inviting other nations to join in further developing this collaborative endeavor after the Washington summit demonstration.

ODDR&E / DMSO
Office of the Secretary of Defense
Washington, DC 20301-3040

Y2K M&S Compliance

Continued from p. 1

change date information when interoperating with other systems to establish Memorandums of Agreement (MOAs). MOAs must spell out how they will deal with the date exchange between systems that may be at different levels of compliance. The status of the MOAs for the models and simulations that interoperate in this fashion will be included in Y2K compliance reports to the DMSO.

The 990 models and simulations due for Y2K compliance checks were previously identified by DoD components in accordance with DoD High Level Architecture (HLA) compliance directives issued in 1996 and 1998.

The DMSO will in turn report M&S Y2K compliance to the Director of Test Systems Engineering and Evaluation (DTSE&E), the Y2K focal point for the office of the Undersecretary of Defense for Acquisition and Technology (USD(A&T)). The USD(A&T) will also report on science and engineering systems, such as those associated with high performance computing; test and evaluation, including operations of Defense test and training ranges; Service and Agency advanced technology demonstrations (ATDs) and advanced concept technology demonstrations (ACTDs); and products and tools under development or in use by Defense and the Service research laboratories.

Further, the DMSO is reviewing its own internal systems including the M&S Information System (MSIS), the M&S Resource Repository (MSRR) and the M&S Operational Support Activity (MSOSA) for Y2K compliance. Although most of these systems rely on commercially available software, the burden is still with DMSO management to insure that they will be operational on January 1, 2000. Tests of these systems will be conducted over the next several months to verify Y2K compliance.

Y2K compliance has been identified as one of the major issues not only for the DoD, but for the entire U.S. Government and private industry. What was once thought to be a problem for an organization's chief information officer is rapidly becoming a major problem for the chief executive officer as the costs for not being prepared for the year 2000 are becoming known. Consequently, it is essential for M&S users and developers to have an active, well-documented Y2K remediation program and regularly report to their respective Y2K management offices and points of contact.

The DoD Year 2000 Master Plan, DoD Compliance Checklist and other Y2K information are available for download online at the DISA web site at *http://www.disa.mil/cio/y2k/cioosd.html*.

Look for future updates on the DMSO Y2K M&S Compliance Program. For additional information contact Terry Hines at 703-824-3443 or *thines@msis.dmso.mil*.

ASK DMSO • ***ASK_DMSO@msis.dmso.mil***

Have a question about the DMSO, its programs or DoD M&S policy, but don't know who to call? Send your query to **ASK_DMSO@msis.dmso.mil**. We'll sort it out, send your question to the right people and get you an answer.